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(54) Colour printing on coated woven flexible glass fibres

(57) The glass fibre substrate, e.g. a curtain fabric, has a polyvinyl chloride, acrylic or polyester calendered coating or lining with a solids content of 8 to 35% by weight with respect to the substrate weight applied. A coloured pattern on a support is transferred to the coating or lining, advancing at a speed between 1 and 4m/min, by a heated roller at a temperature between 140 and 210°C at a pressure between 50 and 500 KPa.

GB 2 249 994 A

PROCESS FOR PRINTING COLOURED PATTERNS ON A SUBSTRATE BASED
ON WOVEN GLASS FIBRES AND NOVEL PRODUCT OBTAINED
FIELD OF THE INVENTION

The present invention relates to a process for printing coloured patterns on a substrate based on woven glass fibers and to the novel product obtained.

5 It concerns the domain of the decoration of various supports by the addition of coloured patterns and more particularly the decoration of supple substrates constituted at least in part, based on woven glass fibers, used in very numerous applications as light
10 screens, curtains, decorative backgrounds, wall coverings, etc...

The products as set forth hereinabove are generally manufactured, by reason of their constituent material, so as to present a uniform single-colour appearance,
15 more generally in a faintly marked shade.

Understandably, it is sought to improve the aesthetic appearance of such substrates by finding a means for providing them with decorative patterns added to such substrates after manufacture thereof.

20 To that end, the prior art discloses the printing of such substrates by screen printing, rotary or otherwise. Such a technique consists in depositing on the face of the substrate to be decorated a paste containing colorants which must then be subjected to a treatment
25 of fixation, generally by heating, and even baking.

As the substrates recalled hereinabove do not present, *per se*, an absorbent character due to the nature of the material constituting them, the printing of coloured patterns by screen printing does not enable
30 patterns of very controllable density and of good definition to be obtained, especially when the patterns employ various colours which must be precisely defined with respect to one another.

Such a result follows from the economic necessity
35 of depositing all the coloured pigments before the

final treatment of fixation and consequently from the impossibility of juxtaposing precisely, without risk of migration, coloured deposits of different shades composing the desired pattern.

5 Insofar as the pattern to be created may satisfy with such a technique, decoration by screen printing does not, however, prove satisfactory or even acceptable. In fact, the colorants are generally deposited on the substrate in layers of appreciable thickness
10 which have for effect, after polymerization or hardening, to stiffen the substrate. Such a result is, of course, unacceptable for a substrate constituted by a textile fabric having to present, by definition, a certain suppleness in the use reserved therefor.

15 Patent FR 82 11122 discloses a decorating technique which consists in coating the support with a liquid plastisol, then in transferring a decorative pattern from a transfer paper whilst the plastisol is still liquid and before it gells. This method is recommended
20 only for small lengths. It presents the major drawback of not mastering the transferred pattern due to the plastic state of the plastisol having to receive it.

25 It is an object of the present invention to overcome the drawbacks set forth hereinabove by proposing a novel process for adding decorative patterns of high definition, of considerable richness, of juxtaposed colours, of high precision and of certain reproducibility, on a supple substrate based on woven glass fibers, without this resulting in layers of appreciable thickness or a hardening of the substrate.

30 The process of the invention is also provided so that the addition of coloured patterns can be effected rapidly at low cost, for making any patterns, complex or not, based on a variable number of colours, fundamental or not.

SUMMARY OF THE INVENTION

To attain the objects set forth hereinabove, the process according to the invention is characterized in that it consists in coating at least one of the 5 faces of the supple substrate with a film of a receiving material of supple character, added at a rate of at least 6% by weight of dry extracts with respect to the weight of the substrate, and in depositing on said gelled film decorative patterns added by direct 10 hot transfer.

The invention also has for an object the novel industrial product constituted by a supple substrate based on woven glass fibers, of which at least one face bears at least locally a coloured imprint added 15 by direct heat transfer.

The process of the invention aims at allowing the decoration of a supple substrate based on woven glass fibers whose thickness, weave and stiffness must be considered as characteristics indifferent 20 to the process.

According to a first step of the process of the invention, the supple substrate is subjected to a first phase of treatment of at least one of its faces on which any coloured pattern is to be added.

25 This first phase of preparation consists in coating the face to be decorated, at least locally, with a supple film of a receiving thermoplastic material which is added at least at a rate of 6% by weight of dry extracts with respect to the weight of the 30 substrate, and preferably between 8 and 35%.

The film of receiving material is added by lining or by coating, in regular and uniform manner, particularly via a calendering possibly followed by a fixation intended to gell and intimately to catch the film 35 added on the face to be decorated.

The film of receiving material, which may be transparent, translucent or slightly coloured, is generally chosen to be based on polyvinyl chloride, acrylic matter or polyester and, in such a case, fixation is ensured by polymerization by heat effect.

The conditions of lining, of coating, of calendering, and of fixation must be considered as forming part of the knowledge of the man skilled in the art having to use such products, for example for the treatment of surfaces of supple supports such as cloths or the like.

When this preparatory phase has been terminated, the film of supple material added on the face of the substrate to be decorated represents a receiving layer in the stable state favourable to receiving and fixing coloured pigments which, within the meaning of the invention, are added by the process of direct heat transfer between a bearing support, generally supple, such as paper and the film coating the surface to be decorated.

Direct heat transfer of the colorants involves placing face to face the supple film coating the face to be decorated and the face of the support bearing the coloured pigments to be transferred and on which the imprint has previously been made to materialize in contours, shapes and colours the pattern having to be transferred onto the film. The substrate and the support are temporarily brought together at a temperature of between 140 and 210°C, applying thereon a pressure of between 0.5 and 5 kg per cm^2 (5.10^4 and 5.10^5 P).

The temporary bringing into contact may result from an application which is then limited to a contact included between 3 and 40 seconds. The temporary application is preferably effected by placing in contact

by continuous advance, at a speed of between 1 and 4 m/min, between a heating cylinder and a pressure means which may be a press roller or a belt enveloping the heating cylinder.

5 Particularly satisfactory results have been obtained by proceeding in accordance with the following Examples.

EXAMPLE 1:

10 A substrate constituted by a fabric of glass fibers of 165 grams/m², of cloth weave, was coated with a supple film of gelled polyvinyl chloride added at a rate of 30% by weight of dry extracts with respect to the weight of the substrate.

15 A supple heat transfer support marketed under the Trademark "PARIDEM" by the firm SUBLISTATIC and bearing reference "FAKIR" was applied statically on the film for a duration of 10 seconds with a pressure of 2 kg/cm² (2.10⁵ P) and at a temperature of 180°C.

20 The whole of the pattern borne by the support was transferred directly by heat onto the film without the apparent presence of a layer of superposed pigments, presenting a clear definition, without alteration of the colours and of the richness of the decorative pattern. Ageing tests have demonstrated an absence 25 of alteration or of degradation of the pattern in time.

EXAMPLE 2

25 A substrate of glass fiber fabric of the following characteristics: 165 grams/m², of cloth weave, was coated on at least one of its faces with a film of gelled polyvinyl chloride, at a rate of 30% by weight of dry extracts with respect to the weight of the substrate.

30 Such a substrate was brought into contact with 35 a heat transfer support marketed under Trademark "PARI-

DEM" of the firm SUBLISTATIC under reference "FAKIR", by advancing at a linear speed of 3 to 4 metres/minute between a heating cylinder and a pressure cylinder exerting a linear pressure of 3 to 4 tons over a length 5 of 160 centimetres corresponding to the width of the substrate and of the support. Heat transfer is effected under good conditions at a temperature of between 140 and 180°C.

As in Example 1, the directly transferred decorative coloured pattern presents a high definition and 10 is without any modification, alteration or degradation of the contours and combination of colours.

EXAMPLE 3:

A substrate with the same characteristics as 15 that of Example 2 was coated with a supple film of acrylic material at a rate of 13% by weight of the substrate. The gelled acrylic film was brought into contact with a heat transfer support marketed under the Trademark "SUBLISTATIC" by the firm SUBLISTATIC 20 and under reference "BLUE MOON". The application was effected by the substrate and support continuously advancing over a heating cylinder taken to a temperature of 195 to 210°C. The applied heat transfer support was maintained applied on the film, during the advance, 25 via a conveyor belt enveloping the heating cylinder over at least 180°. The linear speed adopted was included between 2.5 to 3.5 metres/minute and the pressure of application exerted by the conveyor belt was included between 1 and 2 kg/cm² (1.10⁵ and 2.10⁵ P).

30 Results similar to those mentioned hereinbefore were obtained.

EXAMPLE 4

A substrate with the same characteristics as 35 that used in Examples 2 and 3 was coated with a supple film of polyester, with a thickness close to 5/100th

millimetre.

Such a film was gelled, statically brought into contact with a heat transfer support, marketed under the Trademark "SUBLISTATIC" by the firm SUBLISTATIC under reference "SYCOMORE". Application was effected for 15 to 20 seconds on the film at a temperature of 200°C with a pressure of 2 kg/cm² (2.10⁵ P).

Satisfactory results were also obtained in this case.

A technique of application by advance may also be employed.

By carrying out the operational phases of the process as described hereinabove, a novel product is obtained, constituted by a supple substrate based on woven glass fibers, of which one of the faces bears at least locally a coloured imprint not subject to deterioration, not constituting an apparent layer of added coloured pigments and being made with a high definition, based on high-contrast colorants, of variable densities, defining various patterns of considerable richness, without resulting in the substrate being modified in its overall thickness or in its suppleness.

The invention is not limited to the examples described, as various modifications may be made thereto without departing from its scope.

CLAIMS

1. A coloured product comprising: a flexible substrate comprising woven glass fibres; on at least a part of a face of the substrate, a flexible film whose solids content is 5 at least 6% by weight with respect to the weight of the substrate; and, on the film, a coloured print applied by direct heat transfer.
2. A product according to claim 1, wherein the solids content of the film is 8 to 35% by weight with respect to 10 the weight of the substrate.
3. A product according to claim 1 or claim 2, wherein the film comprises polyvinyl chloride.
4. A product according to claim 1, substantially as exemplified herein.
- 15 5. A process for preparing a product according to any preceding claim, which comprises applying the film onto the substrate, and depositing a decorative pattern on the gelled film by direct heat transfer.
- 20 6. A process according to claim 5, wherein the film is applied by coating or by lining followed by calendering.
7. A process according to claim 5 or claim 6, wherein the direct heat transfer is effected by temporarily bringing 25 into contact the face of the substrate to be decorated and a decorative pattern support, at a temperature of between 140 and 210°C and under a pressure of between 50 and 500 kPa.
- 30 8. A process according to claim 7, which comprises advancing the substrate and the support continuously between a heating cylinder and a press cylinder at a speed of between 1 and 4 metres/minute.

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Relevant Technical fields	Search Examiner
(i) UK CI (Edition K) B6C; CSAB	R J DENNIS
5 (ii) Int CI (Edition) B41M 1/00, 1/26, 1/28, 1/30, 1/32, 1/34, 1/36, 1/38	
Databases (see over)	Date of Search
(i) UK Patent Office	5 FEBRUARY 1992
(ii)	

Documents considered relevant following a search in respect of claims 1 TO 8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 732421 (WOOLDRIK...)	1 to 3 and 5 to 8
X	US 4495012 (GERLAND...)	1, 3, 5 and 6

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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